

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-226908

(43)Date of publication of application : 15.08.2000

(51)Int.Cl.

E04D 1/30

E04D 13/18

H01L 31/042

(21)Application number : 11-030712

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(22)Date of filing : 08.02.1999

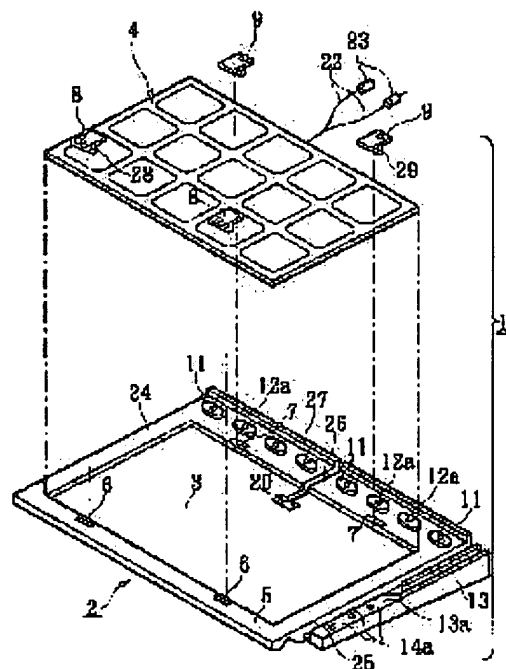
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(54) ROOF TILE WITH SOLAR BATTERY AND MANUFACTURING METHOD THEREOF

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent a solar battery module fixed to the base material for the roof tiles from floating up from the roof base material or being separated therefrom by the wind force blowing to the roof.

SOLUTION: A roof tile 1 with solar batteries intalled in the central recess 3 of a base material 2 for roof tiles is formed so that fixing tools 8, 9 are fixed to the periphery 5 of the base material 2 surrounding the recess 3. The solar battery module 4 is fixed by the fixing tools 8, 9 so as to be pressed by the base material 2 for roof tiles, by fixing the fixing tools 8, 9 to the peripheral part 5 of the base material 2.



## LEGAL STATUS

[Date of request for examination] 11.07.2002

[Date of sending the examiner's decision of rejection] 05.10.2004

[Kind of final disposal of application other than the  
examiner's decision of rejection or application]

converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a roofing tile with a solar battery, and its manufacture approach.

[0002]

[Description of the Prior Art] In recent years, with aggravation of the global environment problems and energy exhaustion problem resulting from consumption increase of a fossil fuel etc., a solar battery is installed on roofs, such as a residence, and the solar energy power generation system for residences which takes out direct power from clean solar energy, and is supplied to a residence is offered variously. For example, a panel-like solar cell module is chiefly laid in the body of a roof panel through a frame-common-equipment base slack spacer, an aeration layer is formed between the body of a roof panel, and a solar cell module, and JP,5-243598,A is provided with the roof panel with a solar battery which wired the power line for taking out power from a solar cell module in this aeration layer. Since according to this roof panel with a solar battery the ascending air current of air occurs by carrying out heat exchange to a solar cell module, and the generated ascending air current flows toward a ridge along a roof side from the front section and is further discharged from the ventilating hole of a ridge outside within the aeration layer by the side of a solar cell module rear face, the temperature rise of a solar cell module is controlled, therefore the energy conversion efficiency of a solar battery can be maintained good.

[0003] Moreover, the roofing tile with a solar battery which contained the solar battery through adhesives to the shallow dent formed in the front face of the body of a roofing tile is indicated by JP,57-68454,A and JP,4-28524,U. According to the configuration of this roofing tile with a solar battery, since it is contained by the dent of the body of a roofing tile, even if peeling by degradation of adhesives arises, the fall from the roof side of a solar battery will be prevented, and so, a solar battery can be installed in comfort, even if it is the large roof of an inclination.

[0004]

[Problem(s) to be Solved by the Invention] By the way, if it was in the conventional roof panel with a solar battery given in JP,5-243598,A, when attaching a solar cell module in the body of a roof panel, waterproofing construction of the joint of about [ needing the complicated exhaust port structure in consideration of ventilation of air for a ridge ], an attachment stand, and roofing etc. was complicated, the man day started, and there was a fault that cost was bulky.

[0005] On the other hand, if it is in a roofing tile with a solar battery given in JP,57-68454,A, JP,4-28524,U, etc., the expensive structures or special waterproofing workmanships, such as a frame-common-equipment base, are not needed chiefly, but it can construct at the simple time and effort which seldom changes to the conventional roofing construction, and cheap cost. However, if it is in the conventional roofing tile with a solar battery given [ above-mentioned ] in an official report, a possibility that the exfoliation phenomenon of adhesives may arise depending on an operating environment, consequently a solar battery may fall by the difference of coefficient of linear expansion with the body of a roofing tile and a solar battery arises, and there is also a problem how many noncombustible ability demanded as roofing the adhesives to be used are filling.

[0006] This invention aims at offering the roofing tile with a solar battery which was not made in view of the above-mentioned situation, and is not based on an operating environment, but can certainly fix a solar battery to a roofing tile base material, and is excellent also in fixed endurance, and is excellent also in incombustibility, and its manufacture approach.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, invention according to claim 1 The roofing tile with a solar battery with which the crevice established in the side front center section of the roofing tile base material comes to contain a solar battery is started. The above-mentioned solar battery contained by

this crevice in the mode suppressed by the above-mentioned roofing tile base material with the fastener attached in the periphery section of the above-mentioned roofing tile base material. The even fixed piece section along this solar-battery side where it comes to be fixed in and the above-mentioned fastener presses down the above-mentioned solar battery. It has the single leg which is between the even piece section of press in alignment with this periphery section for fixing on the above-mentioned periphery section, and this piece section of press and the above-mentioned fixed piece section, and was formed so that it might project caudad, and is characterized by coming to form the depression section for inserting the above-mentioned single leg in the above-mentioned periphery section further.

[0008] Moreover, the above-mentioned fastener is characterized by making it fixed to the above-mentioned periphery section of the above-mentioned roofing tile base material by invention according to claim 2 relating to a roofing tile with a solar battery according to claim 1, forming the conclusion hole which inserts a conclusion implement in the above-mentioned fixed piece section, and driving the above-mentioned conclusion implement into this conclusion hole.

[0009] Moreover, a roofing tile with a solar battery according to claim 1 or 2 is started, the level difference according to the difference of elevation of the above-mentioned fastener which consists in any one piece section of press between the above-mentioned solar battery and the periphery section of the above-mentioned roofing tile base material is formed at least, and invention according to claim 3 is characterized by constituting so that the front face of the above-mentioned solar battery can be forced.

[0010] Moreover, a roofing tile with a solar battery according to claim 1, 2, or 3 is started, the above-mentioned roofing tile base material is fabricated by the pressing method, and invention according to claim 4 is characterized by what was formed of the heights which prepared the above-mentioned depression section in the die.

[0011] Moreover, invention according to claim 5 relates to a roofing tile with a solar battery according to claim 1, 2, 3, or 4, forms a nonreturn pawl in the above-mentioned single leg, and is characterized by constituting and the above-mentioned single leg embedded in the above-mentioned depression section becoming so that it may be hard to escape from this depression section.

[0012] Moreover, the single leg which invention according to claim 6 relates to the manufacture approach of a roofing tile with a solar battery, the crevice for carrying out receipt immobilization of the solar battery is dented in the center section of the roofing tile base material at the periphery section, and the section is formed, respectively, and is embedded by this depression section at a fastener. When the fixed piece section fixed to this periphery section through a conclusion implement and the piece section of press which can force the front face of a solar battery are formed, the above-mentioned solar battery is contained to the above-mentioned crevice of the above-mentioned roofing tile base material and it fixes. It is characterized by having embedded the above-mentioned single leg in the above-mentioned depression section, having fixed the fixed piece section with the above-mentioned conclusion implement subsequently to the above-mentioned periphery section, pushing the above-mentioned solar battery in the above-mentioned piece section of press, and fixing it to the above-mentioned crevice.

[0013]

[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is explained with reference to a drawing. Explanation is concretely given using an example.

◇ The appearance perspective view and drawing 2 which show the appearance configuration of the roofing tile with a solar battery whose 1st example drawing 1 is the 1st example of this invention. The decomposition perspective view and drawing 3 which disassemble and show a roofing tile with the said solar battery. The cross-sectional view in the condition of having cut one of the solar cell modules which constitute a roofing tile with the said solar battery on the cross section, and drawing 4. The fastener inserted in the depression section which consists in the water bottom which is a front side of the roof which carries out inclination is turned over. The appearance perspective view of a \*\*\*\* condition. The appearance perspective view and drawing 7 which show the condition that drawing 5 turns over the fastener inserted in the depression section located in the water bottom which is a ridge side, and a \*\*\*\* appearance perspective view and drawing 6 that a roofing tile with a solar battery on a roof. A view expanded sectional view [ in / in the view expanded sectional view in the VIII-VIII line of drawing 6 and drawing 9 / the IX-IX line of drawing 6 ] and drawing 10 are the important section expanded sectional views in X-X-ray of drawing 2 like [ the view expanded sectional view in the VII-VII line of drawing 6 , and drawing 8 ] drawing 7 .

[0014] The roofing tile base material 2 with which the roofing tile 1 with a solar battery of this example makes the rectangle made from cement as shown in drawing 1 and drawing 2 , The solar cell module 4 which has the configuration of the rectangle held and installed in the crevice 3 formed in the center section of the roofing tile base material 2, It consists of fasteners 8 and 9 fixed to the depression section 6 of the water bottom which was prepared in the periphery section 5 of the roofing tile base material 2, and which is mentioned later, and the depression section 7 of

a water top by inserting. Each fasteners 8 and 9 inserted in the depression sections 6 and 7 are fixed to the crevice 3 of the roofing tile base material 2 by pressing down a solar cell module 4 using the fasteners 8 and 9 which showed the installation to the roofing tile base material 2 of a solar battery 4 to drawing 4 and drawing 5. And thatching construction of the roofing tile 1 with a solar battery constituted in this way drives Nails 12b and 14b into nail hole 14 of nailing \*\*\*\*\* 13a formed in nail hole 12a [ of nailing \*\*\*\*\* 11 ] and receptacle section 13a which were formed in the water bottom a, respectively, and is performed by fixing on the roof substrate material 10, such as sarking.

[0015] The above-mentioned solar cell module 4 is formed so that it may function as abbreviation fit-in of the configuration being carried out in a crevice 3 also considering the shape of a rectangle as nothing and roofing material. Moreover, one side is the optical generation-of-electrical-energy object which makes the rectangle which is about 800mm of abbreviation, and the crystal silicon solar cell cel 16 of two or more sheets by which electrical connection was carried out through the internal lead wire 15 is arranged in the rear face of the transparence glass substrate 17 in all directions, and the structure of the interior sticks it on it with the restoration adhesives 18, subsequently, it is covered with the rear-face covering material 19, and forms a solar cell module 4.

[0016] Moreover, magnitude is the solar battery element of 60mm around, and a cel 16 is laid underground in the state of three line x4 train. Furthermore, it is formed in the front face and its periphery of the glass substrate 8 of a solar cell module 4, and the rear-face covering material 19 by the laminated structure which the sealing agent preferably formed with the ethylene-vinylacetate copolymer with a thickness of 0.4mm was stuck, and coated the top face with the back film of a fluoro resin system.

[0017] Moreover, white sheet tempered glass with a thickness of 3mm which is excellent in light transmittance or impact strength-proof is used for the transparence glass substrate 17. The EVA (ethylene vinyl acetate) film which is excellent in moisture resistance is used for the restoration adhesives 18. Furthermore, the terminal box which is not illustrated protrudes on the rear face of a solar battery 4, when a solar cell module 4 is fixed to a crevice 3, although it becomes depressed and holds in 20, the diode for the soldered joint section or antisuckbacks which connects the internal lead wire of a solar cell module and two output cables 22 which crawl on the rear face of a solar cell module which \*\*\*\*(ed) to the crevice 3 shown in drawing 1 is contained, and the closure of this box is carried out with restoration adhesives, such as silicon resin. And water proofing is performed suitably and, as for the output cable 22, the waterproofing plug socket 23 of a male or a female mold is attached at each tip. Next, nailing \*\*\*\*\* 11 is formed in the periphery section of the water bottom to which the periphery section 5 is formed so that this may surround the perimeter of a crevice 3, and the roofing tile base material 2 is located in the ridge side, and nail hole 12a is installed and constituted there. Although arrangement spacing of this nail hole 12a is based also on the magnitude of a roofing tile, spacing of 50-300mm is consisted and prepared crosswise [ of the roofing tile base material 2 ], for example. A sign 13 shows the receptacle section prepared in right-hand side toward the periphery section 5 of a water top. Although flashing in right and left of the pitch of roof of a roofing tile is not limited especially if it is structure which does not have trouble in arranging a solar cell module in the front face of the roofing tile base material 2, it consists of this example as follows. That is, this receptacle section 13 makes a level difference caudad by the thickness of the periphery section 5 located in the left end of an adjoining roofing tile base material, and crookedness formation is carried out (refer to drawing 9). By this, this left end periphery section laps with this receptacle section 13, the pars tecta 24 is formed, and it connects with right and left. Furthermore, the storm sewage induction slot 25 is engraved on the receptacle section 13 from the water bottom, and it joins near a center section, and it is formed so that it may flow down the front face to the roofing tile with a solar battery of the water bottom one by one. In addition, nail hole 14a of the predetermined number installed in order to drive in nailing \*\*\*\*\* 13a and nail 14b like [ this receptacle section 13 ] the periphery section of the above-mentioned water top is formed.

[0018] Signs 6 and 7 are the depression sections which were beginning to delete the periphery section 5 using the grinding machine beforehand, and were formed, and the single legs 28 and 29 of fasteners 8 and 9 are inserted so that it may mention later. the output cable 22 with which 26 was prolonged from the solar battery 4 should be caught between the rear face of a solar cell module, and a roofing tile base material -- there is nothing -- making -- in order to pull out \*\* outside, it is \*\*\*\*\* cut in the part between a hollow 20 and the waterproofing rib 27 which makes a part of periphery section 5. And when a solar cell module is fixed to the crevice 3 of the roofing tile base material 2, sealing agents, such as covering of the product made of resin or metal and silicon, are prepared in this \*\*\*\*\* 26, or the waterproofing means of the gestalt which combined these is suitably provided to it.

[0019] In addition, although the depression sections 6 and 7 which hold single legs 28 and 29 were formed using the grinding machine Although it dents each time using the tool of dedication and may begin to delete the sections 6 and 7 in case a solar cell module is instead attached at a roofing tile base material If heights are beforehand prepared in the die when manufacturing the roofing tile base material 2 by press forming more preferably, since the depression section

as a crevice can be formed at once at the time of press forming and it is not necessary to carry out difficult grinding or shaving \*\*\*\*, it is efficient.

[0020] Next, fasteners 8 and 9 are explained with reference to drawing 4 and drawing 5. As a fastener 8 is shown in drawing 4, the fastener 9 which it is used for the depression section 6 in the periphery section of the water bottom of the roofing tile base material 2, and is shown in drawing 5 is used for the depression section 7 of the periphery section of a water top. the periphery section 5 of the roofing tile base material with which fasteners 6 and 7 were formed in the even fixed piece sections 30 and 31 which force the periphery section 5 on nothing and its end, and the fixed piece section of those in tabular [ which consists of stainless steel material ] -- the very thing, such as a nail, a screw, a bolt, and a rivet, -- the conclusion holes 33 and 34 in which the well-known conclusion material 32 is made to insert, and the single legs 28 and 29 which protruded so that it might be inserted in the depression sections 6 and 7 be formed. Moreover, the even pieces 35 and 36 (henceforth "the piece section of press") along the solar-battery side for pressing down a solar cell module 4 are formed in the other end of a fastener. It is for making it stick to this level difference in consideration of the level difference produced when the top face of the solar cell module 4 when being installed in a crevice 3 as shown in drawing 10 was higher than the front face of \*\*\*\*\* of a roofing tile base material that a stair-like level difference is especially formed in the piece section 36 of press of the fastener 9 of a water top. Of course, when a level difference does not exist between a solar cell module and a roofing tile base material, it cannot be overemphasized that what has a flat configuration without a level difference is sufficient as the piece section 36 of press of the fastener 9 of a water top. Therefore, although the fastener 8 of the water bottom differs in that configuration from the fastener 9 of a water top, the fastener used for this example In using the fastener 8 of a configuration with which any fastener is shown in drawing 4 when there is no level difference, and having a level difference also to \*\* and the water down side, the fastener used for the water bottom also unifies and uses the fastener 9 of the same configuration as the configuration used for the water bottom. In addition, when a solar cell module 4 is fixed to the roofing tile base material 2 using each [ these ] fastener, it cannot be overemphasized that it is considered so that the piece sections 35 and 36 of press of a fastener may not cover the light-receiving side of the sunrays of a solar battery.

[0021] Moreover, if dimensions, such as width of face of these single legs 28 and 29, projecting die length, and thickness, have large it, rigidity can enlarge installation reinforcement of the fastener to increase, as a result the roofing tile base material 2 so much. therefore, it is desirable to come out, if it is in the range (range where the thickness of the base material of a tile remains about 1mm or more) which is not penetrated at the rear face of a roofing tile base material from a viewpoint on waterproofing of storm sewage, and to set it as the biggest possible dimension.

[0022] Next, how to fix a solar cell module 4 to the crevice 3 of the roofing tile base material 2 is explained. As shown in drawing 2, from the upper part of the roofing tile base material 2, a solar cell module 4 is taken down in the direction shown in an alternate long and short dash line, and is piled up, and a solar cell module is once contained to a crevice 3. At this time, it becomes depressed about the terminal box beforehand located at the rear face of a solar cell module 4, and a proper waterproofing means which contains the output cable 22 to \*\*\*\*\* 26, respectively, and mentioned it above in it is given to 20, and a solar battery 4 is fitted in it in the condition that there is no abbreviation clearance, i.e., play, in a crevice 3 again.

[0023] Next, as shown in drawing 10, the single legs 28 and 29 of fasteners 8 and 9 are inserted in each depression sections 6 and 7, and it carries out [ tacking ] of the fastener. The conclusion implement 32 is inserted in the conclusion holes 33 and 34 in this condition, in the case of a screw or a screw, a conclusion implement stuffs a roofing tile base material, and when conclusion material is a nail, while a nail is driven in and the fixed piece sections 30 and 31 of fasteners 8 and 9 are fixed to the periphery section 5, a solar battery 4 is pushed from a top in the piece sections 35 and 36 of press of fasteners 8 and 9, and it fixes to the roofing tile base material 2. In addition, as the another fixed approach by conclusion material, metal or the support member made of synthetic resin is inserted beforehand suitably into the conclusion hole 33 and 34, the conclusion implement 32 is driven into this, and there is a method of making this and coincidence extend a support member. Thereby, since a fastener is certainly fixable to a roofing tile base material, fixed reinforcement is raised more by the frictional resistance between each part of the support member produced at this time, a conclusion implement, and a conclusion hole. In this way, the piece sections 35 and 36 of press can suppress the top face of a solar cell module 4, it can check being firmly fixed in the condition that a solar battery 4 does not have play in a crevice 3, and the roofing tile with a solar battery which fixed the solar cell module 4 to the roofing tile base material 2 can be obtained.

[0024] Next, the roofing tile 1 with a solar battery (suitably henceforth a "roofing tile" according to a case) obtained in this way is arranged in the roof substrate material 10, and the \*\*\*\* approach is explained. In drawing 6 thru/or drawing 9, first, although the roofing tile is thatched by the longitudinal direction single tier, i.e., a longitudinal direction, at this

time, it drives Nails 12b and 14b, respectively, makes them nail hole 14a which formed nail 12b in nailing \*\*\*\*\* 13a of the receptacle section 13 again at nail hole 12a formed in the periphery section 5 of a water top, and fixes a roofing tile 1 to the roof substrate material 10. At this time, temporary installation is carried out so that the pars tecta 24 of the roofing tile of the right-hand which is going to be thatched from now on may lap on the receptacle section 13 of the roofing tile which it finished thatching, the right and wrong of a relative relative position with a perimeter are checked, and if condition avoids, it thatches by doing a nail clamping activity like the above. And electrical connection of the waterproofing plug socket 23 of the output cable 22 extended from the roofing tile 1 of next doors is carried out one by one mutually.

[0025] Thus, after thatching of the roofing tile of a longitudinal direction single tier finishes, the thatching activity of the roofing tile of the longitudinal direction single tier of an upper case located in the water bottom begins from the water bottom next. Namely, nail 12b is driven into nail hole 12a with the water bottom, nail 14b is driven into nail hole 14a of the receptacle section 13, respectively, and the roofing tile is thatched in the vertical direction toward the water top, i.e., ridge, side one by one. At this time, installation immobilization of the roofing tile which is going to be thatched by the water bottom is carried out so that the periphery section 5 corresponding to the rising wood of the roofing tile which it finished thatching to the water down side, and a part of side edge section may be overlapped.

[0026] Although the roofing tile was fixed by striking nail 16b and nail 14b against nail hole 12a and nail hole 14a when a roofing tile was thatched to the roof substrate material 10 as described above the very thing, such as a product made from asphalt which was excellent in engine performance, such as weatherability, thermal resistance, and waterproofness, on the front face of the roof substrate material 10 at this time, a product made of synthetic resin, and a product made of fiber strengthening resin,, since various kinds of well-known web materials will be laid and water proofing will be performed perfectly Storm sewage is not revealed even if a little storm sewage should leak from a roofing tile. In this way, a roofing tile with a solar battery will fix to roof substrate material, and will be thatched.

[0027] As the roofing tile with a solar battery of this example was mentioned above, dent, insert the single legs 28 and 29 of fasteners 8 and 9 in the sections 6 and 7, and the fixed piece sections 30 and 31 are only fixed to the periphery section 5 with the conclusion implement 32. Since a solar battery 4 is pushed against the crevice 3 of the roofing tile base material 2 and it can fix, without requiring a special water-proofing process, the roofing tile with a solar battery itself can thatch easily on roof substrate material as a usual roofing tile, and it can reduce the construction cost for thatching so much.

[0028] Moreover, a thatching front stirrup produces the bending deformation to which the piece sections 35 and 36 of press tend to come floating up by using the conclusion implement 32 of the fixed piece sections 30 and 31 as the supporting point, when the external force which you are going to make it exfoliate or separate acts on the solar battery of the roofing tile with a solar battery after thatching. However, since single legs 28 and 29 are dented and it is deeply inserted in the sections 5 and 6, the above-mentioned bending deformation of the piece sections 35 and 36 of press is controlled, it can control that play arises between a solar cell module 4 and the piece sections 35 and 36 of press as much as possible, and the effectiveness that a solar battery does not have Lycium chinense with backlash, is stabilized in a crevice 3, and a solar cell module can be held is done so. Moreover, since the piece sections 35 and 36 of press will carry out bending deformation easily also by the small force if the distance from the edge of a solar battery to single legs 28 and 29 or the conclusion implement 32 becomes smaller than it in the case of drawing 10 so that it may understand, if drawing 11 is seen, if the distance is lengthened, it will be hard coming to carry out bending deformation. For this reason, it is effective to make into the location distant from the solar cell module as much as possible the location which a single leg or a conclusion implement installs.

[0029] Furthermore, since adhesives were not used for installation of a solar cell module in this example but the solar cell module was fixed with the mechanical installation means of a fastener, there is no possibility of a solar cell module coming floating or breaking away by the wind which there are not separation from the roofing tile of the solar battery by which it comes from the exfoliation phenomenon of the adhesives by secular change, and omission, and is sprayed on a roof, and it or the situation to slip down can be prevented certainly beforehand. Furthermore, it is also avoided by the dust which carries out \*\*\*\* stop \*\*\*\* deposition with adhesives like before that the light-receiving area of a solar cell module is narrowed, and it becomes advantageous with it at the point which does not cause the fall of generation-of-electrical-energy capacity.

[0030] Moreover, according to the manufacture approach of the roofing tile with a solar battery of this example, as mentioned above, hold installation of the solar cell module 4 is carried out in the crevice 3 of the roofing tile base material 2, it dents in this, the single legs 28 and 29 of fasteners 8 and 9 are inserted in the sections 6 and 7 at it, and a solar cell module 4 can be easily fixed to the roofing tile base material 2 by the easy routing of attaching the fixed piece sections 30 and 31 in the periphery section 5 with the conclusion implement 32, and fixing. For this reason, according



to the configuration of this example, a manufacturing cost can acquire the manufacture approach of a roofing tile with a solar battery with big installation reinforcement at a low price.

[0031] <> Explain the 2nd example of this invention with reference to the 2nd example next drawing 12 , and drawing 13 . Drawing 12 starts the fastener of the 2nd example and the appearance expansion perspective view in that free condition and drawing 13 are the important section expanded sectional views showing the condition of having attached the solar battery in the roofing tile base material 2 using this fastener. The place where the configuration of this 2nd example differs from it of the 1st example mentioned above greatly is the point constituted using the fastener 38 of the shape of a hook which consists of a spring member, as it replaces with the fastener (refer to drawing 4 ) of a T character configuration and is shown in drawing 12 and drawing 13 . At points other than the above, since it is the same as that of the configuration of the 1st above-mentioned example, and abbreviation, in drawing 12 and drawing 13 , the same sign is given to the same each part as the component shown in drawing 4 , and the explanation is omitted.

[0032] That is, the single leg 29 which press working of sheet metal of the fastener 38 is carried out, it is formed with a stainless steel plate, and is pressed fit in the depression sections 6 and 7 is formed in cross-section the configuration of U characters. The dimension of the depression sections 6 and 7 is formed more greatly than that of the 1st example. In the free condition, it spreads in the shape of a reverse Ha character, and this single leg 29 that makes a U character configuration is formed, as shown in drawing 12 . And the width method in drawing 13 of a single leg is set up in consideration of an interrelation with the amount of displacement to which the reverse Ha character flare of the above is reduced compulsorily, and the amount of lugs of a pawl 42 mentioned later, when inserting in the depression sections 6 and 7. In addition, it is desirable for the pars basilaris ossis occipitalis of a single leg to carry out abbreviation contact on the base of the depression sections 6 and 7, or to make it have a gap a little in this case. Moreover, the upper limit of a single leg 29 is extended, the piece section 40 of press which curved in the shape of a cross-section HE typeface is formed, and, thereby, a solar cell module can be pressed down. As shown by the two-dot chain line of drawing 13 , whenever [ angle-of-deflection ] is small, but as it responds for denting and pressing a single leg fit in the sections 6 and 7 and a continuous line shows, elastic deformation of the configuration in the free condition of the piece section 40 of press is carried out, and it is formed so that whenever [ angle-of-deflection ] may become large. Furthermore, with the direction to press fit, the pawl 42 extended to an opposite direction is formed in the base 41 of the pair of a single leg 29 which makes the shape of this U character. furthermore, the periphery section 5 side from a single leg 29 -- two forks -- the fixed piece section 43 which carries out crookedness formation and is prolonged in a \*\* is formed, and, thereby, the periphery section 5 can be pressed down.

[0033] Since it has the above configurations, the fastener 38 of this example is dented, presses fit in the sections 6 and 7 the fastener 38 in the free deformation condition shown in drawing 12 , and conclusion implement 32a is fixed to conclusion hole 32b, and it fixes through and the fixed piece section 43 to the periphery section 5. At this time, the elastic deformation of the piece section 40 of press will be changed into the condition which shows as a continuous line from the condition shown in the two-dot chain line of drawing 13 . For this reason, it \*\*\*\* and the free end 44 of the piece section 40 of press is fixed so that a solar cell module 4 may be pressed down. Thus, since it \*\*\*\* by press energization always being carried out by the spring force with which interlocking of the pawl [ as opposed to / as for a fastener 38, dent single leg 39 the very thing, and contraction deformation is carried out compulsorily in the section, and / the wall of the depression section ] 42 ejection-comes to be hard from the hold section conjointly, and piece section of press 40 the very thing possesses a solar cell module further again, it holds much more certainly, and immobilization can be realized.

[0034] Moreover, according to the manufacture approach of the roofing tile with a solar battery of this example, like the 1st example of the above, a manufacturing cost is cheap and the manufacture approach of a roofing tile with a solar battery with big installation reinforcement can be acquired.

[0035] <> Explain the 3rd example of this invention with reference to the 3rd example next drawing 14 thru/or drawing 16 . The appearance perspective view in the condition that drawing 14 fixed the appearance perspective view of the roofing tile base material 45 to the roofing tile base material, and drawing 15 fixed the solar cell module 4 in one, and drawing 16 are the view expanded sectional views in the XVI-XVI line of drawing 15 . in addition, only the point which is different from the 1st example is explained like the case of the 2nd example, and the same as substantially as the 1st example -- it is -- carrying out -- the same sign is given to an equal member and a part as having been used for these. As shown in drawing 14 , the cross-section quirk-like crevice 47 is formed so that it may meet inside that periphery section 5 at this periphery section 5, and the roofing tile base material 45 of this example is constituted so that the roofing tile base material 45 may form a frame as a whole. Moreover, a fastener 48 is what covered the metal core material 49 which makes the cross section of a T character configuration inside with the synthetic-resin material 50, such as rubber, and the height 53 of plurality [ section / 51 / which makes the shape of an umbrella / press ] is



formed in the head at the leg 52, respectively. In addition, 47' is the \*\*\*\*\* dam section, as the synthetic-resin material 50 does not overflow a crevice 47 outside.

[0036] In this example, immobilization of a solar cell module 4 is performed as follows. First, a solar cell module 4 is held in a crevice 47, and it is filled up with the synthetic-resin material 50 with which the gap between the periphery section 5 and a solar cell module 4 was filled up. Subsequently, into this synthetic-resin material 50 with which it filled up, the press section 51 of an umbrella configuration presses the leg 52 of a fastener 48 fit until it runs against a solar cell module 4 and the periphery section 5. And the synthetic-resin material 50 demonstrates the function as a support member by solidifying, and a fastener 48 stops being able to escape from a gap easily. The piece section 48 of press will press down the periphery section 5 and a solar cell module 4 by this. Thus, according to the roofing tile with a solar battery of this example, a roofing tile with a solar battery can be obtained easily and cheaply only by pressing a fastener 48 fit in the synthetic-resin material 50 which consists in a gap. Moreover, since the gap which consists between a roofing tile and a solar battery is intercepted by the press section 51 from the outside, storm sewage does not permeate into this gap from the exterior, and the synthetic-resin material 50 is protected inside, without being directly exposed to storm sewage or sunlight. Consequently, it can avoid good that exfoliation of the fastener 48 by degradation of synthetic-resin material arises, and appearance appearance can be improved, and further, since the roofing tile base material 2 is formed in the shape of a frame,-izing of the roofing tile with a solar battery can be carried out [ lightweight ] more.

[0037] Next, according to the manufacture approach of the roofing tile with a solar battery of this 3rd example, the same effectiveness as abbreviation [ described / the 1st and 2nd above-mentioned examples ] can be acquired.

[0038] As mentioned above, although the example of this invention has been explained in full detail with the drawing, a concrete configuration is not restricted to this example, and even if there is modification of a design of the range which does not deviate from the summary of this invention etc., it is included in this invention. For example, although one single leg 28 and 29 (the sign given to the fastener 8 shown in drawing 4 is used in order to avoid double \*\* below.) formed in the fastener was formed in the 1st above-mentioned example As instead shown at (a) of drawing 17 , you may prepare suitably two pieces or more than it, and when this raises the installation reinforcement of a fastener further, a fastener is pushed against a solar battery and it can fix. Moreover, the location which the conclusion hole 33 prepares may be made to exist in a solar cell module side to a single leg 28 like drawing 17 (b). Moreover, the suitable radius of circle for the corner of a fastener may be formed from a design and the field of insurance like drawing 17 (c). Moreover, it can coalesce and two components can also be formed for a fastener, as a two-dot chain line shows like drawing 18 (a). The conclusion hole 33 can be formed in a long hole like drawing 18 (b), and, thereby, the installation error over the roofing tile of a fastener can be absorbed good. Moreover, when the top face of a solar cell module is lower than the periphery section of a roofing tile base material, the fastener of the configuration shown in drawing 18 (c) is used. moreover, drawing 19 (a) -- like -- the piece section 35 of press -- two forks -- it forms in a \*\*, or as shown in drawing 19 (b), the thing of a gestalt which prepared two or more single legs 28 and piece section of press 35 grade may be used, and, thereby, installation reinforcement is further raised to a long picture-like fastener. As furthermore shown in drawing 19 (c), the nonreturn pawl 281 opened up to the single leg 28 is bent, and installation stability of a fastener can be realized more certainly.

[0039] Moreover, the effectiveness as the 2nd example that the thing of the configuration shown in drawing 20 and drawing 21 is also the same as a modification of the fastener in the 2nd example can be acquired. That is, the points which are different from the 2nd example only differ in the cross-section configuration of a single leg 55. The upper part of the base 57 where the curved-surface section 56 which the lower part of this single leg 55 presented the radius of circle is formed, and a pair counters curves in the direction which deserts mutually, and at the time of press fit of a fastener, it is formed so that that edge 58 may be dented and it may engage with the wall of the sections 6 and 7 elastically. For this reason, a fastener can be pressed fit easily and a manufacturing cost can be made cheap.

[0040] Moreover, the roofing tile base material 2 of the 3rd example had the rectangular opening 59, as shown in drawing 14 , but as it replaces with this and is shown in drawing 22 which is the appearance perspective view of a roofing tile, may form the crevice 60 of a roofing tile base material as an X character-like pars basilaris ossis occipitalis, and may form opening 59 in the other part. Moreover, you may be partes basilaris ossis occipitalis, such as the shape of the shape of a fence other than [ the viewpoint which attains lightweight-ization to ] this, and a grid. Furthermore, the gestalt of such a roofing tile can be applied also to the 1st example and the 2nd example.

[0041] Moreover, although the quality of the material of the fastener used for each modification of the 1st example shown in the 1st example, drawing 17 , or drawing 19 and the modification as the 2nd example shown in the 2nd example list at drawing 20 was a stainless steel steel plate Instead, the stainlessness or the non-rust processing metal of a galvanization steel plate, a vinyl-chloride-resin paint steel plate, a surface treatment aluminum plate, etc., Or

polyacetal (POM), conversion polyphenylene sulfide (PPE, PPO), You may form by engineering plastics, such as the poly amine, polyarylate (PAR), polyphenylene sulfide (PPS), a polyether ether ketone (PEEK), polyamidoimide (PAI), and polyether imide (PEI), etc.

[0042] Moreover, a proper thing is sufficient as an ellipse form or the configuration which combined the rectangle as it is circular in the 1st example, the 2nd example and the conclusion holes 33 and 34 of the fastener of each of these modifications, and the configuration of 32b25. Moreover, the solar cell module used for this invention is not limited to what is used for each above-mentioned example. That is, it may consist of ingredients, such as a silicon system semiconductor and a compound system semiconductor, and a crystal system semiconductor, an amorphous semiconductor, etc. of a single crystal or polycrystal are sufficient. Especially, when using the thing of crystal system silicon as a solar cell module, since there is high dependability and it excels also in respect of the energy conversion efficiency, it is suitable. Moreover, although an energy conversion efficiency is low a little in the thing of amorphous system silicon compared with the thing of crystal system silicon, when using as a thin film system solar cell module, it is advantageous at the point used as low cost. Furthermore, although the above-mentioned solar cell module can also be used as a module which accumulated many components which consist of a cell of the laminated structure of a crystal system semiconductor, compound system semiconductors, these semiconductors, and an amorphous system semiconductor on one substrate, you may be the module which consists of the solar battery element of one sheet or amorphous system silicon solar cell component of a large area. Moreover, although the front face of a solar battery was formed with the glass substrate 8, what carried out the laminating of the surface-protection material with high transparency like an acrylic resin plate may be used.

[0043] Although the roofing tile base material used in each above-mentioned examples and those modifications was formed by cement material further again, what was formed with the ingredient which compounded organic materials, such as metallic materials, such as inorganic materials other than this, aluminum, and steel, a polycarbonate, and fiber reinforced plastics, or these can also be used. Furthermore, when a solar battery is held and inserted in the crevice of a roofing tile base material, although not limited, some difference of elevation may exist between a solar cell module and the periphery section of a roofing tile base material, and the solar cell module top face is preferably higher than the periphery section from a viewpoint of water proofing, or it is good the degree of the fitting, especially to consider as the same field at least. It is because it becomes advantageous in respect of maintenance of a roofing tile with a solar battery when considering as the same field.

[0044] Moreover, although a fastener is fixed to the periphery section, in the case of the 1st example of the above, and the 2nd example, the conclusion implements 32 and 32a were driven in, but a screw, a screw, a nail, etc. may be used instead of this conclusion implement. Moreover, when the quality of the material of a roofing tile is formed by the product made of resin, or metal, it fixes suitably besides these using adhesives etc. Thus, according to the quality of the material of a roofing tile base material, a suitable secure-closing means is employable. Furthermore, packing which has a waterproofing function may be made to be placed between the rear faces of a fastener, or a waterproof cap may be put on the head of the conclusion implement 32 so that storm sewage may not permeate from a conclusion hole.

[0045]

[Effect of the Invention] As explained above, in order according to the roofing tile with a solar battery of this invention to use conclusion implements, such as a screw, for a roofing tile base material and to attach a fastener very easily, there is no possibility of this solar cell module coming floating, or breaking away with the wind force sprayed on the roof thatched [ pushed certainly the solar cell module arranged in the crevice of the front face of a roofing tile base material, and fixed consequently ]. Moreover, without requiring a special water-proofing process, the roofing tile with a solar battery itself can thatch easily on roof substrate material as a usual roofing tile, and it can reduce the construction cost for thatching so much. Moreover, since according to the roofing tile with a solar battery of this invention it is what is equipped with a solar cell module by the above-mentioned fastener in the crevice of the front face of a roofing tile base material beforehand before thatching a roofing tile, It compares with thatching of the usual roofing tile on the occasion of thatching of a roofing tile with a solar battery. Only the man day which connects the output code of a solar battery to wiring beforehand prepared according to the easy activity of \*\* which inserts the plug socket attached at the tip mutually does not pass to be added, roofing-work construction becomes very easy, as a result a roof construction cost can be made cheap.

[0046] Moreover, according to the manufacture approach of the roofing tile with a solar battery this invention, the solar cell module is held in the crevice of a roofing tile base material, and the single leg 26 of a fastener can be inserted in this at the hold section 21, and by the easy routing of attaching the fixed piece section in a periphery edge with a conclusion implement, a solar battery is easily pushed against a roofing tile, it can fix, and, for this reason, a manufacturing cost can acquire the manufacture approach of a roofing tile with a solar battery with big installation

reinforcement at a low price so much.

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[Translation done.]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a roofing tile with a solar battery, and its manufacture approach.

[0002]

[Description of the Prior Art] In recent years, with aggravation of the global environment problems and energy exhaustion problem resulting from consumption increase of a fossil fuel etc., a solar battery is installed on roofs, such as a residence, and the solar energy power generation system for residences which takes out direct power from clean solar energy, and is supplied to a residence is offered variously. For example, a panel-like solar cell module is chiefly laid in the body of a roof panel through a frame-common-equipment base slack spacer, an aeration layer is formed between the body of a roof panel, and a solar cell module, and JP,5-243598,A is provided with the roof panel with a solar battery which wired the power line for taking out power from a solar cell module in this aeration layer. Since according to this roof panel with a solar battery the ascending air current of air occurs by carrying out heat exchange to a solar cell module, and the generated ascending air current flows toward a ridge along a roof side from the front section and is further discharged from the ventilating hole of a ridge outside within the aeration layer by the side of a solar cell module rear face, the temperature rise of a solar cell module is controlled, therefore the energy conversion efficiency of a solar battery can be maintained good.

[0003] Moreover, the roofing tile with a solar battery which contained the solar battery through adhesives to the shallow dent formed in the front face of the body of a roofing tile is indicated by JP,57-68454,A and JP,4-28524,U. According to the configuration of this roofing tile with a solar battery, since it is contained by the dent of the body of a roofing tile, even if peeling by degradation of adhesives arises, the fall from the roof side of a solar battery will be prevented, and so, a solar battery can be installed in comfort, even if it is the large roof of an inclination.

[0004]

[Problem(s) to be Solved by the Invention] By the way, if it was in the conventional roof panel with a solar battery given in JP,5-243598,A, when attaching a solar cell module in the body of a roof panel, waterproofing construction of the joint of about [ needing the complicated exhaust port structure in consideration of ventilation of air for a ridge ], an attachment stand, and roofing etc. was complicated, the man day started, and there was a fault that cost was bulky.

[0005] On the other hand, if it is in a roofing tile with a solar battery given in JP,57-68454,A, JP,4-28524,U, etc., the expensive structures or special waterproofing workmanships, such as a frame-common-equipment base, are not needed chiefly, but it can construct at the simple time and effort which seldom changes to the conventional roofing construction, and cheap cost. However, if it is in the conventional roofing tile with a solar battery given [ above-mentioned ] in an official report, a possibility that the exfoliation phenomenon of adhesives may arise depending on an operating environment, consequently a solar battery may fall by the difference of coefficient of linear expansion with the body of a roofing tile and a solar battery arises, and there is also a problem how many noncombustible ability demanded as roofing the adhesives to be used are filling.

[0006] This invention aims at offering the roofing tile with a solar battery which was not made in view of the above-mentioned situation, and is not based on an operating environment, but can certainly fix a solar battery to a roofing tile base material, and is excellent also in fixed endurance, and is excellent also in incombustibility, and its manufacture approach.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, invention according to claim 1 The roofing tile with a solar battery with which the crevice established in the side front center section of the roofing tile base material comes to contain a solar battery is started. The above-mentioned solar battery contained by

this crevice in the mode suppressed by the above-mentioned roofing tile base material with the fastener attached in the periphery section of the above-mentioned roofing tile base material The even fixed piece section along this solar-battery side where it comes to be fixed in and the above-mentioned fastener presses down the above-mentioned solar battery, It has the single leg which is between the even piece section of press in alignment with this periphery section for fixing on the above-mentioned periphery section, and this piece section of press and the above-mentioned fixed piece section, and was formed so that it might project caudad, and is characterized by coming to form the depression section for inserting the above-mentioned single leg in the above-mentioned periphery section further.

[0008] Moreover, the above-mentioned fastener is characterized by making it fixed to the above-mentioned periphery section of the above-mentioned roofing tile base material by invention according to claim 2 relating to a roofing tile with a solar battery according to claim 1, forming the conclusion hole which inserts a conclusion implement in the above-mentioned fixed piece section, and driving the above-mentioned conclusion implement into this conclusion hole.

[0009] Moreover, a roofing tile with a solar battery according to claim 1 or 2 is started, the level difference according to the difference of elevation of the above-mentioned fastener which consists in any one piece section of press between the above-mentioned solar battery and the periphery section of the above-mentioned roofing tile base material is formed at least, and invention according to claim 3 is characterized by constituting so that the front face of the above-mentioned solar battery can be forced.

[0010] Moreover, a roofing tile with a solar battery according to claim 1, 2, or 3 is started, the above-mentioned roofing tile base material is fabricated by the pressing method, and invention according to claim 4 is characterized by what was formed of the heights which prepared the above-mentioned depression section in the die.

[0011] Moreover, invention according to claim 5 relates to a roofing tile with a solar battery according to claim 1, 2, 3, or 4, forms a nonreturn pawl in the above-mentioned single leg, and is characterized by constituting and the above-mentioned single leg embedded in the above-mentioned depression section becoming so that it may be hard to escape from this depression section.

[0012] Moreover, the single leg which invention according to claim 6 relates to the manufacture approach of a roofing tile with a solar battery, the crevice for carrying out receipt immobilization of the solar battery is dented in the center section of the roofing tile base material at the periphery section, and the section is formed, respectively, and is embedded by this depression section at a fastener, When the fixed piece section fixed to this periphery section through a conclusion implement and the piece section of press which can force the front face of a solar battery are formed, the above-mentioned solar battery is contained to the above-mentioned crevice of the above-mentioned roofing tile base material and it fixes, It is characterized by having embedded the above-mentioned single leg in the above-mentioned depression section, having fixed the fixed piece section with the above-mentioned conclusion implement subsequently to the above-mentioned periphery section, pushing the above-mentioned solar battery in the above-mentioned piece section of press, and fixing it to the above-mentioned crevice.

[0013]

[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is explained with reference to a drawing. Explanation is concretely given using an example.

◇ The appearance perspective view and drawing 2 which show the appearance configuration of the roofing tile with a solar battery whose 1st example drawing 1 is the 1st example of this invention The decomposition perspective view and drawing 3 which disassemble and show a roofing tile with the said solar battery The cross-sectional view in the condition of having cut one of the solar cell modules which constitute a roofing tile with the said solar battery on the cross section, and drawing 4 The fastener inserted in the depression section which consists in the water bottom which is a front side of the roof which carries out inclination is turned over. The appearance perspective view of a \*\*\*\* condition, The appearance perspective view and drawing 7 which show the condition that drawing 5 turns over the fastener inserted in the depression section located in the water bottom which is a ridge side, and a \*\*\*\* appearance perspective view and drawing 6 thatch a roofing tile with a solar battery on a roof A view expanded sectional view [ in / in the view expanded sectional view in the VIII-VIII line of drawing 6 and drawing 9 / the IX-IX line of drawing 6 ] and drawing 10 are the important section expanded sectional views in X-X-ray of drawing 2 like [ the view expanded sectional view in the VII-VII line of drawing 6 , and drawing 8 ] drawing 7 .

[0014] The roofing tile base material 2 with which the roofing tile 1 with a solar battery of this example makes the rectangle made from cement as shown in drawing 1 and drawing 2 , The solar cell module 4 which has the configuration of the rectangle held and installed in the crevice 3 formed in the center section of the roofing tile base material 2, It consists of fasteners 8 and 9 fixed to the depression section 6 of the water bottom which was prepared in the periphery section 5 of the roofing tile base material 2, and which is mentioned later, and the depression section 7 of

a water top by inserting. Each fasteners 8 and 9 inserted in the depression sections 6 and 7 are fixed to the crevice 3 of the roofing tile base material 2 by pressing down a solar cell module 4 using the fasteners 8 and 9 which showed the installation to the roofing tile base material 2 of a solar battery 4 to drawing 4 and drawing 5. And thatching construction of the roofing tile 1 with a solar battery constituted in this way drives Nails 12b and 14b into nail hole 14 of nailing \*\*\*\*\* 13a formed in nail hole 12a [ of nailing \*\*\*\*\* 11 ] and receptacle section 13a which were formed in the water bottom a, respectively, and is performed by fixing on the roof substrate material 10, such as sarking.

[0015] The above-mentioned solar cell module 4 is formed so that it may function as abbreviation fit-in of the configuration being carried out in a crevice 3 also considering the shape of a rectangle as nothing and roofing material. Moreover, one side is the optical generation-of-electrical-energy object which makes the rectangle which is about 800mm of abbreviation, and the crystal silicon solar cell cel 16 of two or more sheets by which electrical connection was carried out through the internal lead wire 15 is arranged in the rear face of the transparence glass substrate 17 in all directions, and the structure of the interior sticks it on it with the restoration adhesives 18, subsequently, it is covered with the rear-face covering material 19, and forms a solar cell module 4.

[0016] Moreover, magnitude is the solar battery element of 60mm around, and a cel 16 is laid underground in the state of three line x4 train. Furthermore, it is formed in the front face and its periphery of the glass substrate 8 of a solar cell module 4, and the rear-face covering material 19 by the laminated structure which the sealing agent preferably formed with the ethylene-vinylacetate copolymer with a thickness of 0.4mm was stuck, and coated the top face with the back film of a fluoro-resin system.

[0017] Moreover, white sheet tempered glass with a thickness of 3mm which is excellent in light transmittance or impact strength-proof is used for the transparence glass substrate 17. The EVA (ethylene vinyl acetate) film which is excellent in moisture resistance is used for the restoration adhesives 18. Furthermore, the terminal box which is not illustrated protrudes on the rear face of a solar battery 4, when a solar cell module 4 is fixed to a crevice 3, although it becomes depressed and holds in 20, the diode for the soldered joint section or antisuckbacks which connects the internal lead wire of a solar cell module and two output cables 22 which crawl on the rear face of a solar cell module which \*\*\*\*(ed) to the crevice 3 shown in drawing 1 is contained, and the closure of this box is carried out with restoration adhesives, such as silicon resin. And water proofing is performed suitably and, as for the output cable 22, the waterproofing plug socket 23 of a male or a female mold is attached at each tip. Next, nailing \*\*\*\*\* 11 is formed in the periphery section of the water bottom to which the periphery section 5 is formed so that this may surround the perimeter of a crevice 3, and the roofing tile base material 2 is located in the ridge side, and nail hole 12a is installed and constituted there. Although arrangement spacing of this nail hole 12a is based also on the magnitude of a roofing tile, spacing of 50-300mm is consisted and prepared crosswise [ of the roofing tile base material 2 ], for example. A sign 13 shows the receptacle section prepared in right-hand side toward the periphery section 5 of a water top. Although flashing in right and left of the pitch of roof of a roofing tile is not limited especially if it is structure which does not have trouble in arranging a solar cell module in the front face of the roofing tile base material 2, it consists of this example as follows. That is, this receptacle section 13 makes a level difference caudad by the thickness of the periphery section 5 located in the left end of an adjoining roofing tile base material, and crookedness formation is carried out (refer to drawing 9). By this, this left end periphery section laps with this receptacle section 13, the pars tecta 24 is formed, and it connects with right and left. Furthermore, the storm sewage induction slot 25 is engraved on the receptacle section 13 from the water bottom, and it joins near a center section, and it is formed so that it may flow down the front face to the roofing tile with a solar battery of the water bottom one by one. In addition, nail hole 14a of the predetermined number installed in order to drive in nailing \*\*\*\*\* 13a and nail 14b like [ this receptacle section 13 ] the periphery section of the above-mentioned water top is formed.

[0018] Signs 6 and 7 are the depression sections which were beginning to delete the periphery section 5 using the grinding machine beforehand, and were formed, and the single legs 28 and 29 of fasteners 8 and 9 are inserted so that it may mention later. the output cable 22 with which 26 was prolonged from the solar battery 4 should be caught between the rear face of a solar cell module, and a roofing tile base material -- there is nothing -- making -- in order to pull out \*\* outside, it is \*\*\*\*\* cut in the part between a hollow 20 and the waterproofing rib 27 which makes a part of periphery section 5. And when a solar cell module is fixed to the crevice 3 of the roofing tile base material 2, sealing agents, such as covering of the product made of resin or metal and silicon, are prepared in this \*\*\*\*\* 26, or the waterproofing means of the gestalt which combined these is suitably provided to it.

[0019] In addition, although the depression sections 6 and 7 which hold single legs 28 and 29 were formed using the grinding machine Although it dents each time using the tool of dedication and may begin to delete the sections 6 and 7 in case a solar cell module is instead attached at a roofing tile base material If heights are beforehand prepared in the die when manufacturing the roofing tile base material 2 by press forming more preferably, since the depression section

as a crevice can be formed at once at the time of press forming and it is not necessary to carry out difficult grinding or shaving \*\*\*\*, it is efficient.

[0020] Next, fasteners 8 and 9 are explained with reference to drawing 4 and drawing 5. As a fastener 8 is shown in drawing 4, the fastener 9 which it is used for the depression section 6 in the periphery section of the water bottom of the roofing tile base material 2, and is shown in drawing 5 is used for the depression section 7 of the periphery section of a water top. the periphery section 5 of the roofing tile base material with which fasteners 6 and 7 were formed in the even fixed piece sections 30 and 31 which force the periphery section 5 on nothing and its end, and the fixed piece section of those in tabular [ which consists of stainless steel material ] -- the very thing, such as a nail, a screw, a bolt, and a rivet, -- the conclusion holes 33 and 34 in which the well-known conclusion material 32 is made to insert, and the single legs 28 and 29 which protruded so that it might be inserted in the depression sections 6 and 7 be formed. Moreover, the even pieces 35 and 36 (henceforth "the piece section of press") along the solar-battery side for pressing down a solar cell module 4 are formed in the other end of a fastener. It is for making it stick to this level difference in consideration of the level difference produced when the top face of the solar cell module 4 when being installed in a crevice 3 as shown in drawing 10 was higher than the front face of \*\*\*\*\* of a roofing tile base material that a stair-like level difference is especially formed in the piece section 36 of press of the fastener 9 of a water top. Of course, when a level difference does not exist between a solar cell module and a roofing tile base material, it cannot be overemphasized that what has a flat configuration without a level difference is sufficient as the piece section 36 of press of the fastener 9 of a water top. Therefore, although the fastener 8 of the water bottom differs in that configuration from the fastener 9 of a water top, the fastener used for this example In using the fastener 8 of a configuration with which any fastener is shown in drawing 4 when there is no level difference, and having a level difference also to \*\* and the water down side, the fastener used for the water bottom also unifies and uses the fastener 9 of the same configuration as the configuration used for the water bottom. In addition, when a solar cell module 4 is fixed to the roofing tile base material 2 using each [ these ] fastener, it cannot be overemphasized that it is considered so that the piece sections 35 and 36 of press of a fastener may not cover the light-receiving side of the sunrays of a solar battery.

[0021] Moreover, if dimensions, such as width of face of these single legs 28 and 29, projecting die length, and thickness, have large it, rigidity can enlarge installation reinforcement of the fastener to increase, as a result the roofing tile base material 2 so much. therefore, it is desirable to come out, if it is in the range (range where the thickness of the base material of a tile remains about 1mm or more) which is not penetrated at the rear face of a roofing tile base material from a viewpoint on waterproofing of storm sewage, and to set it as the biggest possible dimension.

[0022] Next, how to fix a solar cell module 4 to the crevice 3 of the roofing tile base material 2 is explained. As shown in drawing 2, from the upper part of the roofing tile base material 2, a solar cell module 4 is taken down in the direction shown in an alternate long and short dash line, and is piled up, and a solar cell module is once contained to a crevice 3. At this time, it becomes depressed about the terminal box beforehand located at the rear face of a solar cell module 4, and a proper waterproofing means which contains the output cable 22 to \*\*\*\*\* 26, respectively, and mentioned it above in it is given to 20, and a solar battery 4 is fitted in it in the condition that there is no abbreviation clearance, i.e., play, in a crevice 3 again.

[0023] Next, as shown in drawing 10, the single legs 28 and 29 of fasteners 8 and 9 are inserted in each depression sections 6 and 7, and it carries out [ tacking ] of the fastener. The conclusion implement 32 is inserted in the conclusion holes 33 and 34 in this condition, in the case of a screw or a screw, a conclusion implement stuffs a roofing tile base material, and when conclusion material is a nail, while a nail is driven in and the fixed piece sections 30 and 31 of fasteners 8 and 9 are fixed to the periphery section 5, a solar battery 4 is pushed from a top in the piece sections 35 and 36 of press of fasteners 8 and 9, and it fixes to the roofing tile base material 2. In addition, as the another fixed approach by conclusion material, metal or the support member made of synthetic resin is inserted beforehand suitably into the conclusion hole 33 and 34, the conclusion implement 32 is driven into this, and there is a method of making this and coincidence extend a support member. Thereby, since a fastener is certainly fixable to a roofing tile base material, fixed reinforcement is raised more by the frictional resistance between each part of the support member produced at this time, a conclusion implement, and a conclusion hole. In this way, the piece sections 35 and 36 of press can suppress the top face of a solar cell module 4, it can check being firmly fixed in the condition that a solar battery 4 does not have play in a crevice 3, and the roofing tile with a solar battery which fixed the solar cell module 4 to the roofing tile base material 2 can be obtained.

[0024] Next, the roofing tile 1 with a solar battery (suitably henceforth a "roofing tile" according to a case) obtained in this way is arranged in the roof substrate material 10, and the \*\*\*\* approach is explained. In drawing 6 thru/or drawing 9, first, although the roofing tile is thatched by the longitudinal direction single tier, i.e., a longitudinal direction, at this



time, it drives Nails 12b and 14b, respectively, makes them nail hole 14a which formed nail 12b in nailing \*\*\*\*\* 13a of the receptacle section 13 again at nail hole 12a formed in the periphery section 5 of a water top, and fixes a roofing tile 1 to the roof substrate material 10. At this time, temporary installation is carried out so that the pars tecta 24 of the roofing tile of the right-hand which is going to be thatched from now on may lap on the receptacle section 13 of the roofing tile which it finished thatching, the right and wrong of a relative relative position with a perimeter are checked, and if condition avoids, it thatches by doing a nail clamping activity like the above. And electrical connection of the waterproofing plug socket 23 of the output cable 22 extended from the roofing tile 1 of next doors is carried out one by one mutually.

[0025] Thus, after thatching of the roofing tile of a longitudinal direction single tier finishes, the thatching activity of the roofing tile of the longitudinal direction single tier of an upper case located in the water bottom begins from the water bottom next. Namely, nail 12b is driven into nail hole 12a with the water bottom, nail 14b is driven into nail hole 14a of the receptacle section 13, respectively, and the roofing tile is thatched in the vertical direction toward the water top, i.e., ridge, side one by one. At this time, installation immobilization of the roofing tile which is going to be thatched by the water bottom is carried out so that the periphery section 5 corresponding to the rising wood of the roofing tile which it finished thatching to the water down side, and a part of side edge section may be overlapped.

[0026] Although the roofing tile was fixed by striking nail 16b and nail 14b against nail hole 12a and nail hole 14a when a roofing tile was thatched to the roof substrate material 10 as described above the very thing, such as a product made from asphalt which was excellent in engine performance, such as weatherability, thermal resistance, and waterproofness, on the front face of the roof substrate material 10 at this time, a product made of synthetic resin, and a product made of fiber strengthening resin,, since various kinds of well-known web materials will be laid and water proofing will be performed perfectly Storm sewage is not revealed even if a little storm sewage should leak from a roofing tile. In this way, a roofing tile with a solar battery will fix to roof substrate material, and will be thatched.

[0027] As the roofing tile with a solar battery of this example was mentioned above, dent, insert the single legs 28 and 29 of fasteners 8 and 9 in the sections 6 and 7, and the fixed piece sections 30 and 31 are only fixed to the periphery section 5 with the conclusion implement 32. Since a solar battery 4 is pushed against the crevice 3 of the roofing tile base material 2 and it can fix, without requiring a special water-proofing process, the roofing tile with a solar battery itself can thatch easily on roof substrate material as a usual roofing tile, and it can reduce the construction cost for thatching so much.

[0028] Moreover, a thatching front stirrup produces the bending deformation to which the piece sections 35 and 36 of press tend to come floating up by using the conclusion implement 32 of the fixed piece sections 30 and 31 as the supporting point, when the external force which you are going to make it exfoliate or separate acts on the solar battery of the roofing tile with a solar battery after thatching. However, since single legs 28 and 29 are dented and it is deeply inserted in the sections 5 and 6, the above-mentioned bending deformation of the piece sections 35 and 36 of press is controlled, it can control that play arises between a solar cell module 4 and the piece sections 35 and 36 of press as much as possible, and the effectiveness that a solar battery does not have Lycium chinense with backlash, is stabilized in a crevice 3, and a solar cell module can be held is done so. Moreover, since the piece sections 35 and 36 of press will carry out bending deformation easily also by the small force if the distance from the edge of a solar battery to single legs 28 and 29 or the conclusion implement 32 becomes smaller than it in the case of drawing 10 so that it may understand, if drawing 11 is seen, if the distance is lengthened, it will be hard coming to carry out bending deformation. For this reason, it is effective to make into the location distant from the solar cell module as much as possible the location which a single leg or a conclusion implement installs.

[0029] Furthermore, since adhesives were not used for installation of a solar cell module in this example but the solar cell module was fixed with the mechanical installation means of a fastener, there is no possibility of a solar cell module coming floating or breaking away by the wind which there are not separation from the roofing tile of the solar battery by which it comes from the exfoliation phenomenon of the adhesives by secular change, and omission, and is sprayed on a roof, and it or the situation to slip down can be prevented certainly beforehand. Furthermore, it is also avoided by the dust which carries out \*\*\*\* stop \*\*\*\* deposition with adhesives like before that the light-receiving area of a solar cell module is narrowed, and it becomes advantageous with it at the point which does not cause the fall of generation-of-electrical-energy capacity.

[0030] Moreover, according to the manufacture approach of the roofing tile with a solar battery of this example, as mentioned above, hold installation of the solar cell module 4 is carried out in the crevice 3 of the roofing tile base material 2, it dents in this, the single legs 28 and 29 of fasteners 8 and 9 are inserted in the sections 6 and 7 at it, and a solar cell module 4 can be easily fixed to the roofing tile base material 2 by the easy routing of attaching the fixed piece sections 30 and 31 in the periphery section 5 with the conclusion implement 32, and fixing. For this reason, according

to the configuration of this example, a manufacturing cost can acquire the manufacture approach of a roofing tile with a solar battery with big installation reinforcement at a low price.

[0031] <> Explain the 2nd example of this invention with reference to the 2nd example next drawing 12 , and drawing 13 . Drawing 12 starts the fastener of the 2nd example and the appearance expansion perspective view in that free condition and drawing 13 are the important section expanded sectional views showing the condition of having attached the solar battery in the roofing tile base material 2 using this fastener. The place where the configuration of this 2nd example differs from it of the 1st example mentioned above greatly is the point constituted using the fastener 38 of the shape of a hook which consists of a spring member, as it replaces with the fastener (refer to drawing 4 ) of a T character configuration and is shown in drawing 12 and drawing 13 . At points other than the above, since it is the same as that of the configuration of the 1st above-mentioned example, and abbreviation, in drawing 12 and drawing 13 , the same sign is given to the same each part as the component shown in drawing 4 , and the explanation is omitted.

[0032] That is, the single leg 29 which press working of sheet metal of the fastener 38 is carried out, it is formed with a stainless steel plate, and is pressed fit in the depression sections 6 and 7 is formed in cross-section the configuration of U characters. The dimension of the depression sections 6 and 7 is formed more greatly than that of the 1st example. In the free condition, it spreads in the shape of a reverse Ha character, and this single leg 29 that makes a U character configuration is formed, as shown in drawing 12 . And the width method in drawing 13 of a single leg is set up in consideration of an interrelation with the amount of displacement to which the reverse Ha character flare of the above is reduced compulsorily, and the amount of lugs of a pawl 42 mentioned later, when inserting in the depression sections 6 and 7. In addition, it is desirable for the pars basilaris ossis occipitalis of a single leg to carry out abbreviation contact on the base of the depression sections 6 and 7, or to make it have a gap a little in this case. Moreover, the upper limit of a single leg 29 is extended, the piece section 40 of press which curved in the shape of a cross-section HE typeface is formed, and, thereby, a solar cell module can be pressed down. As shown by the two-dot chain line of drawing 13 , whenever [ angle-of-deflection ] is small, but as it responds for denting and pressing a single leg fit in the sections 6 and 7 and a continuous line shows, elastic deformation of the configuration in the free condition of the piece section 40 of press is carried out, and it is formed so that whenever [ angle-of-deflection ] may become large. Furthermore, with the direction to press fit, the pawl 42 extended to an opposite direction is formed in the base 41 of the pair of a single leg 29 which makes the shape of this U character. furthermore, the periphery section 5 side from a single leg 29 -- two forks -- the fixed piece section 43 which carries out crookedness formation and is prolonged in a \*\* is formed, and, thereby, the periphery section 5 can be pressed down.

[0033] Since it has the above configurations, the fastener 38 of this example is dented, presses fit in the sections 6 and 7 the fastener 38 in the free deformation condition shown in drawing 12 , and conclusion implement 32a is fixed to conclusion hole 32b, and it fixes through and the fixed piece section 43 to the periphery section 5. At this time, the elastic deformation of the piece section 40 of press will be changed into the condition which shows as a continuous line from the condition shown in the two-dot chain line of drawing 13 . For this reason, it \*\*\*\* and the free end 44 of the piece section 40 of press is fixed so that a solar cell module 4 may be pressed down. Thus, since it \*\*\*\* by press energization always being carried out by the spring force with which interlocking of the pawl [ as opposed to / as for a fastener 38, dent single leg 39 the very thing, and contraction deformation is carried out compulsorily in the section, and / the wall of the depression section ] 42 ejection-comes to be hard from the hold section conjointly, and piece section of press 40 the very thing possesses a solar cell module further again, it holds much more certainly, and immobilization can be realized.

[0034] Moreover, according to the manufacture approach of the roofing tile with a solar battery of this example, like the 1st example of the above, a manufacturing cost is cheap and the manufacture approach of a roofing tile with a solar battery with big installation reinforcement can be acquired.

[0035] <> Explain the 3rd example of this invention with reference to the 3rd example next drawing 14 thru/or drawing 16 . The appearance perspective view in the condition that drawing 14 fixed the appearance perspective view of the roofing tile base material 45 to the roofing tile base material, and drawing 15 fixed the solar cell module 4 in one, and drawing 16 are the view expanded sectional views in the XVI-XVI line of drawing 15 . in addition, only the point which is different from the 1st example is explained like the case of the 2nd example, and the same as substantially as the 1st example -- it is -- carrying out -- the same sign is given to an equal member and a part as having been used for these. As shown in drawing 14 , the cross-section quirk-like crevice 47 is formed so that it may meet inside that periphery section 5 at this periphery section 5, and the roofing tile base material 45 of this example is constituted so that the roofing tile base material 45 may form a frame as a whole. Moreover, a fastener 48 is what covered the metal core material 49 which makes the cross section of a T character configuration inside with the synthetic-resin material 50, such as rubber, and the height 53 of plurality [ section / 51 / which makes the shape of an umbrella / press ] is

formed in the head at the leg 52, respectively. In addition, 47' is the \*\*\*\*\* dam section, as the synthetic-resin material 50 does not overflow a crevice 47 outside.

[0036] In this example, immobilization of a solar cell module 4 is performed as follows. First, a solar cell module 4 is held in a crevice 47, and it is filled up with the synthetic-resin material 50 with which the gap between the periphery section 5 and a solar cell module 4 was filled up. Subsequently, into this synthetic-resin material 50 with which it filled up, the press section 51 of an umbrella configuration presses the leg 52 of a fastener 48 fit until it runs against a solar cell module 4 and the periphery section 5. And the synthetic-resin material 50 demonstrates the function as a support member by solidifying, and a fastener 48 stops being able to escape from a gap easily. The piece section 48 of press will press down the periphery section 5 and a solar cell module 4 by this. Thus, according to the roofing tile with a solar battery of this example, a roofing tile with a solar battery can be obtained easily and cheaply only by pressing a fastener 48 fit in the synthetic-resin material 50 which consists in a gap. Moreover, since the gap which consists between a roofing tile and a solar battery is intercepted by the press section 51 from the outside, storm sewage does not permeate into this gap from the exterior, and the synthetic-resin material 50 is protected inside, without being directly exposed to storm sewage or sunlight. Consequently, it can avoid good that exfoliation of the fastener 48 by degradation of synthetic-resin material arises, and appearance appearance can be improved, and further, since the roofing tile base material 2 is formed in the shape of a frame,-izing of the roofing tile with a solar battery can be carried out [ lightweight ] more.

[0037] Next, according to the manufacture approach of the roofing tile with a solar battery of this 3rd example, the same effectiveness as abbreviation [ described / the 1st and 2nd above-mentioned examples ] can be acquired.

[0038] As mentioned above, although the example of this invention has been explained in full detail with the drawing, a concrete configuration is not restricted to this example, and even if there is modification of a design of the range which does not deviate from the summary of this invention etc., it is included in this invention. For example, although one single leg 28 and 29 (the sign given to the fastener 8 shown in drawing 4 is used in order to avoid double \*\* below.) formed in the fastener was formed in the 1st above-mentioned example As instead shown at (a) of drawing 17 , you may prepare suitably two pieces or more than it, and when this raises the installation reinforcement of a fastener further, a fastener is pushed against a solar battery and it can fix. Moreover, the location which the conclusion hole 33 prepares may be made to exist in a solar cell module side to a single leg 28 like drawing 17 (b). Moreover, the suitable radius of circle for the corner of a fastener may be formed from a design and the field of insurance like drawing 17 (c). Moreover, it can coalesce and two components can also be formed for a fastener, as a two-dot chain line shows like drawing 18 (a). The conclusion hole 33 can be formed in a long hole like drawing 18 (b), and, thereby, the installation error over the roofing tile of a fastener can be absorbed good. Moreover, when the top face of a solar cell module is lower than the periphery section of a roofing tile base material, the fastener of the configuration shown in drawing 18 (c) is used. moreover, drawing 19 (a) -- like -- the piece section 35 of press -- two forks -- it forms in a \*\*, or as shown in drawing 19 (b), the thing of a gestalt which prepared two or more single legs 28 and piece section of press 35 grade may be used, and, thereby, installation reinforcement is further raised to a long picture-like fastener. As furthermore shown in drawing 19 (c), the nonreturn pawl 281 opened up to the single leg 28 is bent, and installation stability of a fastener can be realized more certainly.

[0039] Moreover, the effectiveness as the 2nd example that the thing of the configuration shown in drawing 20 and drawing 21 is also the same as a modification of the fastener in the 2nd example can be acquired. That is, the points which are different from the 2nd example only differ in the cross-section configuration of a single leg 55. The upper part of the base 57 where the curved-surface section 56 which the lower part of this single leg 55 presented the radius of circle is formed, and a pair counters curves in the direction which deserts mutually, and at the time of press fit of a fastener, it is formed so that that edge 58 may be dented and it may engage with the wall of the sections 6 and 7 elastically. For this reason, a fastener can be pressed fit easily and a manufacturing cost can be made cheap.

[0040] Moreover, the roofing tile base material 2 of the 3rd example had the rectangular opening 59, as shown in drawing 14 , but as it replaces with this and is shown in drawing 22 which is the appearance perspective view of a roofing tile, may form the crevice 60 of a roofing tile base material as an X character-like pars basilaris ossis occipitalis, and may form opening 59 in the other part. Moreover, you may be partes basilaris ossis occipitalis, such as the shape of the shape of a fence other than [ the viewpoint which attains lightweight-ization to ] this, and a grid. Furthermore, the gestalt of such a roofing tile can be applied also to the 1st example and the 2nd example.

[0041] Moreover, although the quality of the material of the fastener used for each modification of the 1st example shown in the 1st example, drawing 17 , or drawing 19 and the modification as the 2nd example shown in the 2nd example list at drawing 20 was a stainless steel steel plate Instead, the stainlessness or the non-rust processing metal of a galvanization steel plate, a vinyl-chloride-resin paint steel plate, a surface treatment aluminum plate, etc., Or

polyacetal (POM), conversion polyphenylene sulfide (PPE, PPO), You may form by engineering plastics, such as the poly ape phone, polyarylate (PAR), polyphenylene sulfide (PPS), a polyether ether ketone (PEEK), polyamidoimide (PAI), and polyether imide (PEI), etc.

[0042] Moreover, a proper thing is sufficient as an ellipse form or the configuration which combined the rectangle as it is circular in the 1st example, the 2nd example and the conclusion holes 33 and 34 of the fastener of each of these modifications, and the configuration of 32b25. Moreover, the solar cell module used for this invention is not limited to what is used for each above-mentioned example. That is, it may consist of ingredients, such as a silicon system semi-conductor and a compound system semi-conductor, and a crystal system semi-conductor, an amorphous semiconductor, etc. of a single crystal or polycrystal are sufficient. Especially, when using the thing of crystal system silicon as a solar cell module, since there is high dependability and it excels also in respect of the energy conversion efficiency, it is suitable. Moreover, although an energy conversion efficiency is low a little in the thing of amorphous system silicon compared with the thing of crystal system silicon, when using as a thin film system solar cell module, it is advantageous at the point used as low cost. Furthermore, although the above-mentioned solar cell module can also be used as a module which accumulated many components which consist of a cel of the laminated structure of a crystal system semi-conductor, compound system semi-conductors, these semi-conductors, and an amorphous system semi-conductor on one substrate, you may be the module which consists of the solar battery element of one sheet or amorphous system silicon solar cell component of a large area. Moreover, although the front face of a solar battery was formed with the glass substrate 8, what carried out the laminating of the surface-protection material with high transparency like an acrylic resin plate may be used.

[0043] Although the roofing tile base material used in each above-mentioned examples and those modifications was formed by cement material further again, what was formed with the ingredient which compounded organic materials, such as metallic materials, such as inorganic materials other than this, aluminum, and steel, a polycarbonate, and fiber reinforced plastics, or these can also be used. Furthermore, when a solar battery is held and inserted in the crevice of a roofing tile base material, although not limited, some difference of elevation may exist between a solar cell module and the periphery section of a roofing tile base material, and the solar cell module top face is preferably higher than the periphery section from a viewpoint of water proofing, or it is good the degree of the fitting, especially to consider as the same field at least. It is because it becomes advantageous in respect of maintenance of a roofing tile with a solar battery when considering as the same field.

[0044] Moreover, although a fastener is fixed to the periphery section, in the case of the 1st example of the above, and the 2nd example, the conclusion implements 32 and 32a were driven in, but a screw, a screw, a nail, etc. may be used instead of this conclusion implement. Moreover, when the quality of the material of a roofing tile is formed by the product made of resin, or metal, it fixes suitably besides these using adhesives etc. Thus, according to the quality of the material of a roofing tile base material, a suitable secure-closing means is employable. Furthermore, packing which has a waterproofing function may be made to be placed between the rear faces of a fastener, or a waterproof cap may be put on the head of the conclusion implement 32 so that storm sewage may not permeate from a conclusion hole.

[0045]

[Effect of the Invention] As explained above, in order according to the roofing tile with a solar battery of this invention to use conclusion implements, such as a screw, for a roofing tile base material and to attach a fastener very easily, there is no possibility of this solar cell module coming floating, or breaking away with the wind force sprayed on the roof thatched [ pushed certainly the solar cell module arranged in the crevice of the front face of a roofing tile base material, and fixed consequently ]. Moreover, without requiring a special water-proofing process, the roofing tile with a solar battery itself can thatch easily on roof substrate material as a usual roofing tile, and it can reduce the construction cost for thatching so much. Moreover, since according to the roofing tile with a solar battery of this invention it is what is equipped with a solar cell module by the above-mentioned fastener in the crevice of the front face of a roofing tile base material beforehand before thatching a roofing tile, It compares with thatching of the usual roofing tile on the occasion of thatching of a roofing tile with a solar battery. Only the man day which connects the output code of a solar battery to wiring beforehand prepared according to the easy activity of \*\* which inserts the plug socket attached at the tip mutually does not pass to be added, roofing-work construction becomes very easy, as a result a roof construction cost can be made cheap.

[0046] Moreover, according to the manufacture approach of the roofing tile with a solar battery this invention, the solar cell module is held in the crevice of a roofing tile base material, and the single leg 26 of a fastener can be inserted in this at the hold section 21, and by the easy routing of attaching the fixed piece section in a periphery edge with a conclusion implement, a solar battery is easily pushed against a roofing tile, it can fix, and, for this reason, a manufacturing cost can acquire the manufacture approach of a roofing tile with a solar battery with big installation

reinforcement at a low price so much.

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[Translation done.]

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CLAIMS

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[Claim(s)]

[Claim 1] It is the roofing tile with a solar battery with which the crevice established in the side front center section of the roofing tile base material comes to contain a solar battery. Said solar battery contained by this crevice in the mode suppressed by said roofing tile base material with the fastener attached in the periphery section of said roofing tile base material. The even fixed piece section along this solar-battery side where it comes to be fixed in and said fastener presses down said solar battery, The even piece section of press in alignment with this periphery section for fixing on said periphery section, The roofing tile with a solar battery which is between this piece section of press, and said fixed piece section, has the formed single leg so that it may project caudad, and is further characterized by coming to form the depression section for inserting said single leg in said periphery section.

[Claim 2] The roofing tile with a solar battery according to claim 1 with which said fastener is characterized by making it fixed to said periphery section of said roofing tile base material by forming the conclusion hole which inserts a conclusion implement in said fixed piece section, and driving said conclusion implement into this conclusion hole.

[Claim 3] The roofing tile with a solar battery according to claim 1 or 2 characterized by constituting so that the level difference according to the difference of elevation of said fastener which consists in any one piece section of press between said solar batteries and periphery sections of said roofing tile base material may be formed at least and the front face of said solar battery can be forced.

[Claim 4] The roofing tile with a solar battery according to claim 1, 2, or 3 characterized by what was formed of the heights which said roofing tile base material was fabricated by the pressing method, and prepared said depression section in the die.

[Claim 5] The roofing tile with a solar battery according to claim 1, 2, 3, or 4 characterized by constituting and said single leg which formed the nonreturn pawl in said single leg, and was embedded in said depression section becoming so that it may be hard to escape from this depression section.

[Claim 6] The single leg which the crevice for carrying out receipt immobilization of the solar battery is dented in the periphery section, and the section is formed in the center section of the roofing tile base material, respectively, and is embedded by this depression section at a fastener, When the fixed piece section fixed to this periphery section through a conclusion implement and the piece section of press which can force the front face of a solar battery are formed, said solar battery is contained to said crevice of said roofing tile base material and it fixes, The manufacture approach of the roofing tile with a solar battery characterized by having embedded said single leg in said depression section, having fixed the fixed piece section with said conclusion implement subsequently to said periphery section, pushing said solar battery in said piece section of press, and fixing it to said crevice.

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[Translation done.]

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the appearance perspective view showing the appearance configuration of the roofing tile with a solar battery which is the 1st example of this invention.

[Drawing 2] It is the decomposition perspective view disassembling and showing a roofing tile with the said solar battery.

[Drawing 3] It is a cross-sectional view in the condition of having cut one of the solar cell modules which constitute a roofing tile with the said solar battery on the cross section.

[Drawing 4] It is an appearance perspective view in the condition of having turned over the fastener which is applied to the fastener used for this example, and is located in the water bottom of the roof which carries out inclination.

[Drawing 5] The fastener similarly located in the water bottom is turned over, and it is a perspective view in a \*\*\*\* condition.

[Drawing 6] It is the appearance perspective view showing a \*\*\*\* condition for the above-mentioned roofing tile with a solar battery on a roof.

[Drawing 7] It is a \*\*\*\* expanded sectional view from the VII-VII arrowed direction of drawing 6 .

[Drawing 8] It is the expanded sectional view of the roof by which \*\*\*\* thatching was carried out from the VIII-VIII arrowed direction of drawing 6 .

[Drawing 9] It is the view expanded sectional view of the thatched roof in the IX-IX line of drawing 6 .

[Drawing 10] It is the important section expanded sectional view of the roofing tile with a solar battery in X-X-ray of drawing 2 .

[Drawing 11] It is an explanation sectional view for explaining as compared with the operation effectiveness of this example.

[Drawing 12] It is drawing showing the fastener of the 2nd example of this invention, and is an appearance expansion perspective view in that free condition.

[Drawing 13] It is the important section expanded sectional view showing the condition of having attached the solar battery in the roofing tile base material using the fixed means.

[Drawing 14] It is the appearance perspective view of the roofing tile base material in the 3rd example of this invention.

[Drawing 15] It is an appearance perspective view in the condition of having fixed the solar battery to the roofing tile.

[Drawing 16] It is a view expanded sectional view in the XVI-XVI line of drawing 15 .

[Drawing 17] It is the modification of the fastener used for the 1st example of the above, and the appearance perspective view which (a) requires for the 1st modification, the appearance perspective view which (b) requires for the 2nd modification, and (c) are the appearance perspective views concerning the 3rd modification.

[Drawing 18] It is the modification of the fastener used for the 1st example of the above, and the appearance perspective view which (a) requires for the 4th modification, the appearance perspective view which (b) requires for the 5th modification, and (c) are the appearance perspective views concerning the 6th modification.

[Drawing 19] It is the modification of the fastener used for the 1st example of the above, and the appearance perspective view which (a) requires for the 7th modification, the appearance perspective view which (b) requires for the 8th modification, and (c) are the appearance perspective views concerning the 9th modification.

[Drawing 20] The modification of the fastener of the 2nd example of this invention is started, and it is the appearance expansion perspective view of a fastener simple substance.

[Drawing 21] It is the important section expanded sectional view showing the condition that a solar battery is fixed to a roofing tile base material by the fastener concerning the modification of the 2nd example.



[Drawing 22] It is an appearance perspective view in the modification of the roofing tile base material concerning the 3rd example of the above.

[Description of Notations]

1 38 Roofing tile with a solar battery

2 Roofing Tile Base Material

3 Crevice

4 Solar Cell Module

5 Periphery Section

6 Seven Depression section

8, 9, 38 Fastener

22 Output Cable

23 Waterproofing Plug Socket

28.29 Single Leg

30, 31, 43 Fixed piece section

32 32a Conclusion implement

32b, 33, 34 Conclusion hole

35 36 Piece section of press

281 42 Nonreturn pawl

40 Piece Section of Press

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[Translation done.]

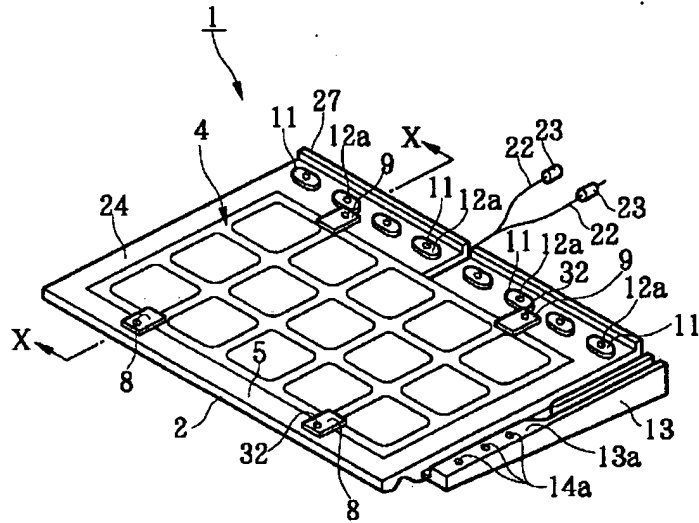
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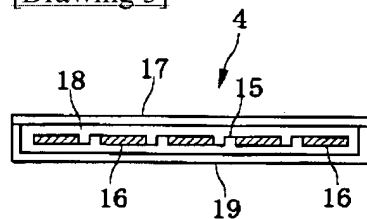
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## DRAWINGS

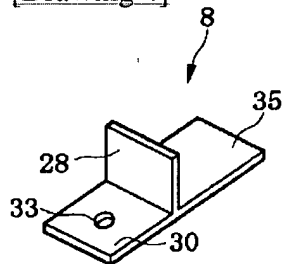
[Drawing 1]



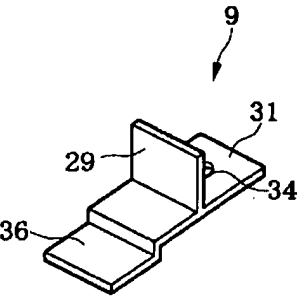
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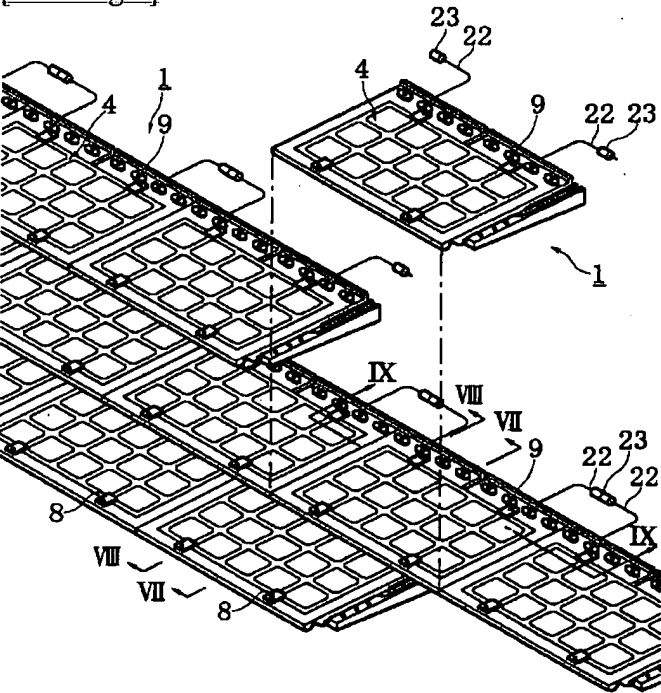
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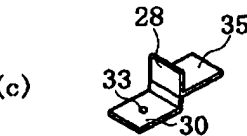
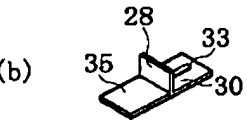
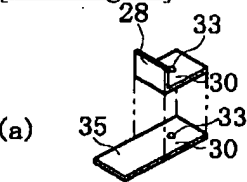
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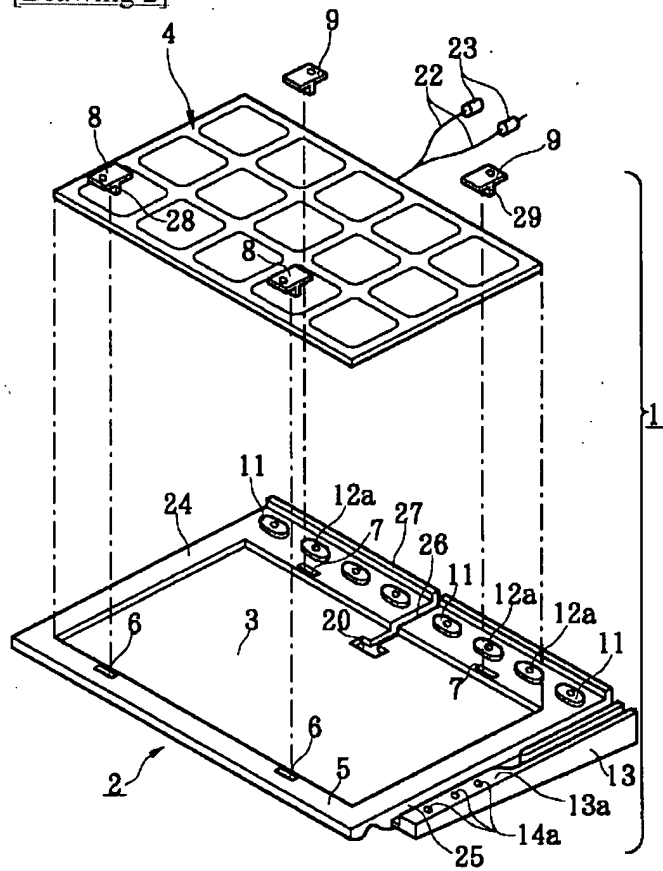
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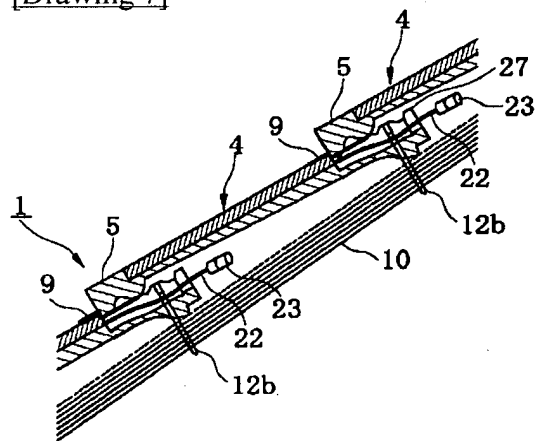
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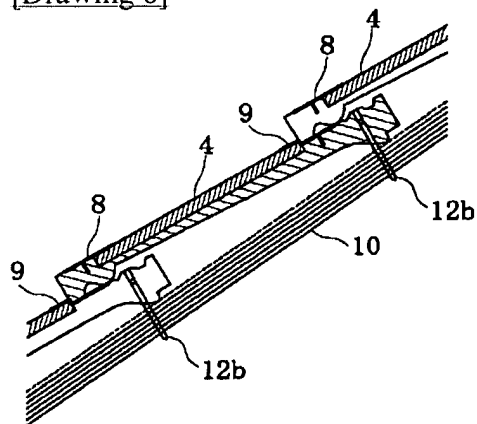
[Drawing 2]



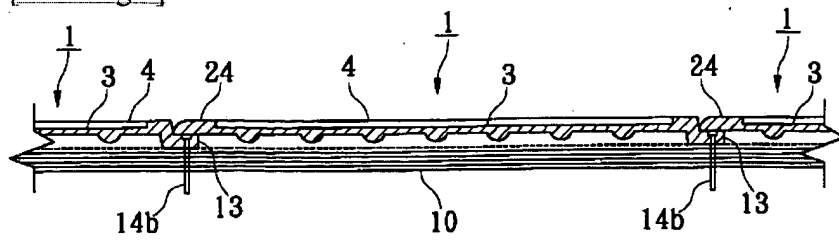
[Drawing 7]



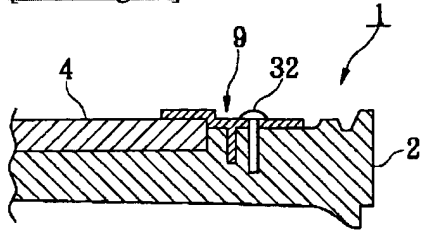
[Drawing 8]



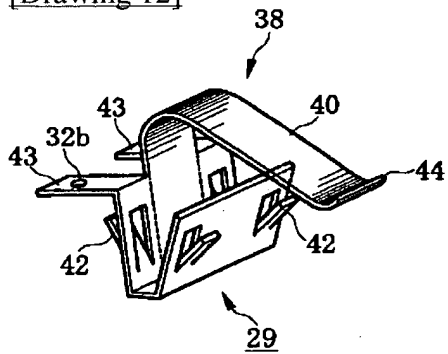
[Drawing 9]



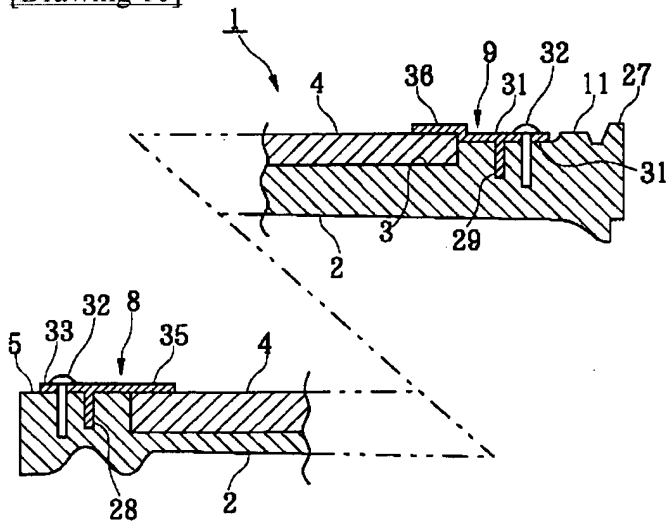
[Drawing 11]



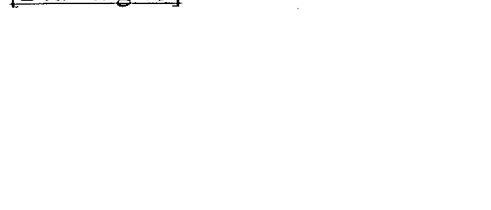
[Drawing 12]

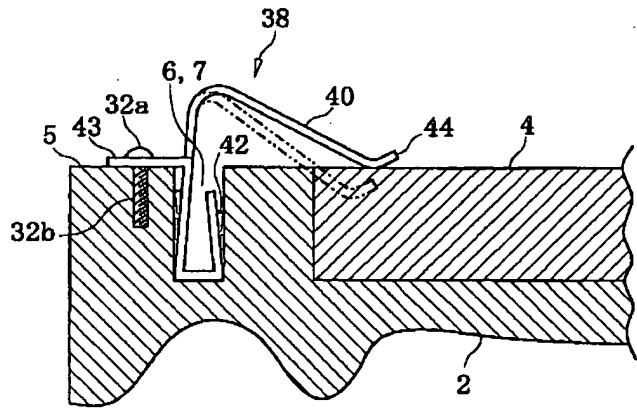


[Drawing 10]

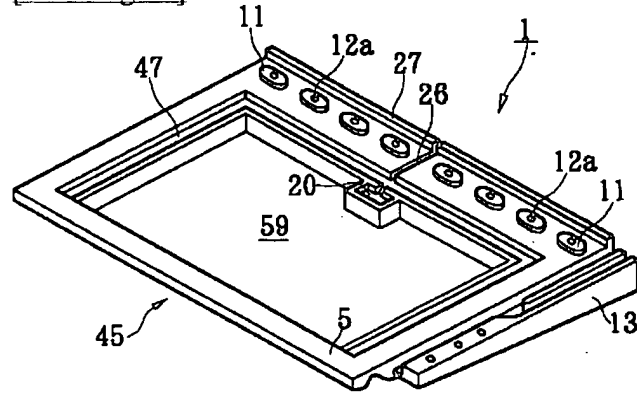


[Drawing 13]

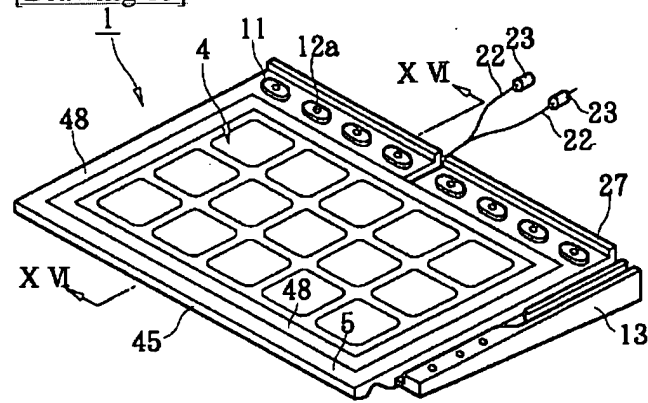




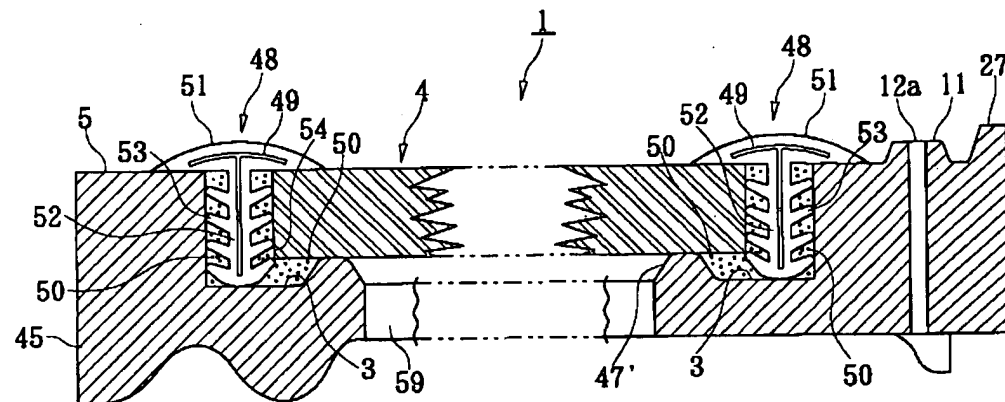
[Drawing 14]



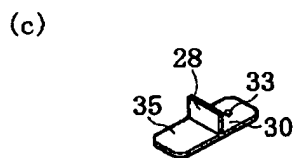
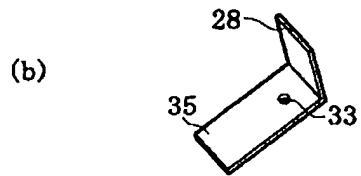
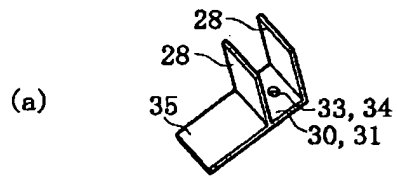
[Drawing 15]



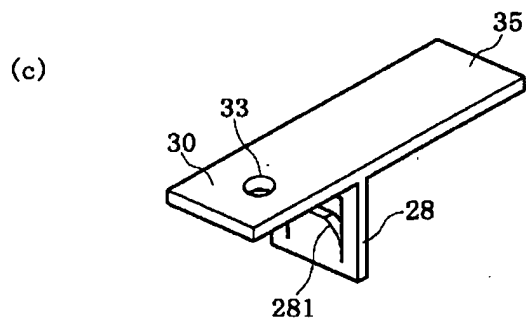
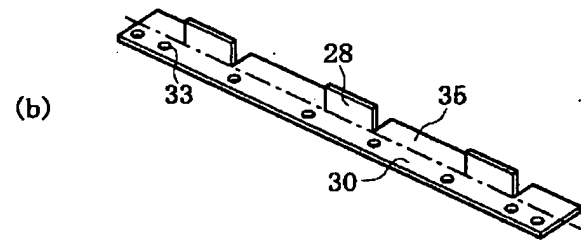
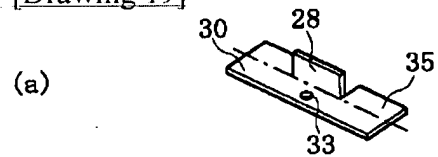
[Drawing 16]



[Drawing 17]

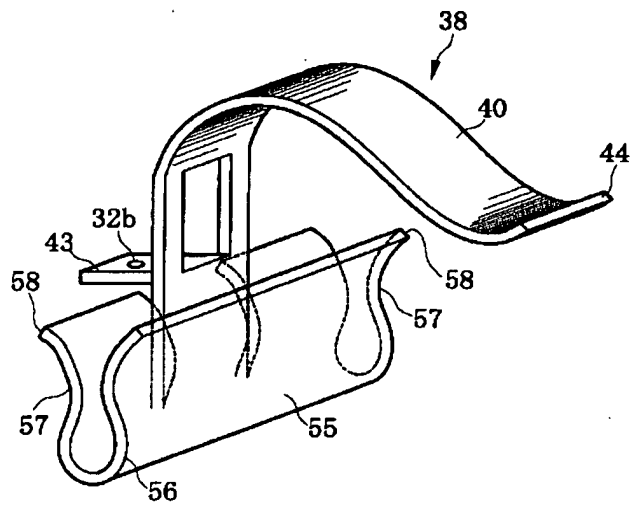


[Drawing 19]

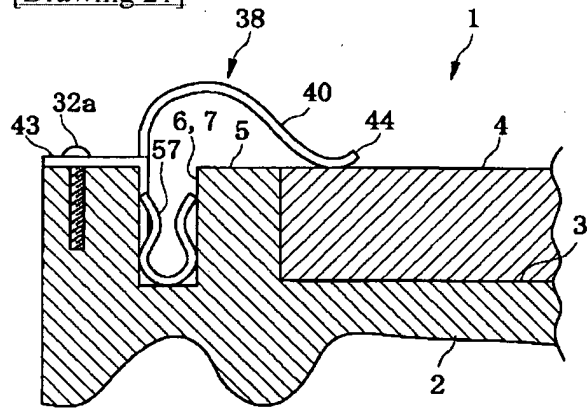


[Drawing 20]

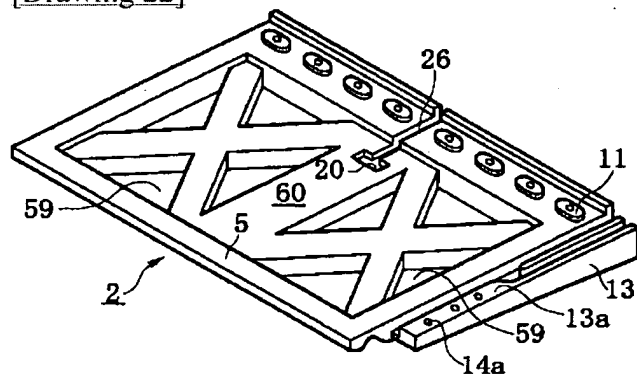




[Drawing 21]



[Drawing 22]



[Translation done.]